EOSDIS Core System Project

ECS Project Training Material Volume 3: Problem Management

March 2001

Raytheon Systems Company
Upper Marlboro, Maryland

ECS Project Training Material
Volume 3: Problem Management

March 2001

Prepared Under Contract NAS5-60000
CDRL Item 129

RESPONSIBLE ENGINEER

Paul E. Van Hemel   Date
EOSDIS Core System Project

SUBMITTED BY

Gary Sloan, M&O Manager   Date
EOSDIS Core System Project

Raytheon Systems Company
Upper Marlboro, Maryland

625-CD-503-003

This page intentionally left blank.

Preface

This document is a contract deliverable with an approval code of 3. As such, it does not require formal Government approval. This document is delivered for information only, but is subject to approval as meeting contractual requirements.

Any questions should be addressed to:

Data Management Office
The ECS Project Office
Raytheon Systems Company
1616 McCormick Dr.
Upper Marlboro, MD 20774-5301

Note: This document contains change bars to indicate the addition or revision of material since the issuance of the predecessor document containing training material for Release 5B of the Earth Observing System Data and Information System (EOSDIS) Core System (ECS).

This page intentionally left blank.

Abstract

This is Volume 3 of a series of lessons containing the training material for Release 6A of the Earth Observing System Data and Information System (EOSDIS) Core System (ECS). This lesson provides a detailed description of the process required for submitting and updating trouble tickets as well as investigating problems and identifying and implementing solutions.

Keywords: training, instructional design, course objective, problem management, trouble ticket, Help Desk, Problem Review Board, Non-conformance Report (NCR), Remedy.

This page intentionally left blank.

Change Information Page

List of Effective Pages	
Page Number	**Issue**
Title	Original
iii through x	Original
1 through 46	Original
Slide Presentation 1 through 55	Original

Document History			
Document Number	**Status/Issue**	**Publication Date**	**CCR Number**
625-CD-603-001	Original	March 2001	

This page intentionally left blank.

Contents

Preface

Abstract

Introduction

Related Documentation

Problem Management

Writing a Trouble Ticket (TT)

Documenting Changes

Problem Resolution

The Problem Review Board and Processing a Trouble Ticket through the Problem Resolution Process

Making Emergency Fixes

Practical Exercise

Slide Presentation

Introduction

Identification

Training Material Volume 3 is part of Contract Data Requirements List (CDRL) Item 129, whose requirements are specified in Data Item Description (DID) 625/OP3 and is a required deliverable under the Earth Observing System Data and Information System (EOSDIS) Core System (ECS), Contract (NAS5-60000).

Scope

Training Material Volume 3 describes the process and procedures by which trouble tickets are submitted and updated. In addition, the lesson describes in general terms the processes by which problems submitted on trouble tickets are investigated and solutions are identified and implemented. This lesson is designed to provide the operations staff with sufficient knowledge and information to satisfy all lesson objectives.

Purpose

The purpose of this Student Guide is to provide a detailed course of instruction that forms the basis for understanding problem management. Lesson objectives are developed and will be used to guide the flow of instruction for this lesson. The lesson objectives will serve as the basis for verifying that all lesson topics are contained within this Student Guide and slide presentation material.

Status and Schedule

This lesson module provides detailed information about training for Release 6A. Subsequent revisions will be submitted as needed.

Organization

This document is organized as follows:

Introduction:	The Introduction presents the document identification, scope, purpose, and organization.
Related Documentation:	Related Documentation identifies parent, applicable and information documents associated with this document.
Student Guide:	The Student Guide identifies the core elements of this lesson. All Lesson Objectives and associated topics are included.
Slide Presentation:	Slide Presentation is reserved for all slides used by the instructor during the presentation of this lesson.

This page intentionally left blank.

Related Documentation

Parent Document

The parent document is the document from which this ECS Training Material's scope and content are derived.

423-41-01   Goddard Space Flight Center, EOSDIS Core System (ECS) Statement of Work

Applicable Documents

The following documents are referenced within this ECS Training Material, or are directly applicable, or contain policies or other directive matters that are binding upon the content of this document:

420-05-03   Goddard Space Flight Center, Earth Observing System (EOS) Performance Assurance Requirements for the EOSDIS Core System (ECS)

423-41-02   Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS)

Information Documents

Information Documents Referenced

The following documents are referenced herein and amplify or clarify the information presented in this document. These documents are not binding on the content of the ECS Training Material.

609-CD-600   Release 6A Operations Tools Manual for the ECS Project

611-CD-600   Mission Operation Procedures for the ECS Project

910-TDA-022   Custom Configuration Parameters for ECS Release 6A

Information Documents Not Referenced

The following documents, although not referenced herein and/or not directly applicable, do amplify or clarify the information presented in this document. These documents are not binding on the content of the ECS Training Material.

305-CD-600   Release 6A Segment/Design Specification for the ECS Project

311-CD-600   Release 6A Data Management Subsystem Database Design and Database Schema Specifications for the ECS Project

311-CD-601   Release 6A Ingest Database Design and Database Schema Specifications for the ECS Project

311-CD-602	Release 6A Interoperability Subsystem (IOS) Database Design and Database Schema Specifications for the ECS Project
311-CD-603	Release 6A Planning and Data Processing Subsystem Database Design and Schema Specifications for the ECS Project
311-CD-604	Release 6A Science Data Server Database Design and Schema Specifications for the ECS Project
311-CD-605	Release 6A Storage Management and Data Distribution Subsystems Database Design and Database Schema Specifications for the ECS Project
311-CD-606	Release 6A Subscription Server Database Design and Schema Specifications for the ECS Project
311-CD-607	Release 6A Systems Management Subsystem Database Design and Schema Specifications for the ECS Project
311-CD-608	Release 6A Registry Database Design and Schema Specifications for the ECS Project
313-CD-600	Release 6A ECS Internal Interface Control Document for the ECS Project
334-CD-600	6A Science System Release Plan for the ECS Project
601-CD-001	Maintenance and Operations Management Plan for the ECS Project
603-CD-003	ECS Operational Readiness Plan for Release 2.0
604-CD-001	Operations Concept for the ECS Project: Part 1-- ECS Overview
604-CD-002	Operations Concept for the ECS Project: Part 2B -- ECS Release B
605-CD-002	Release B SDPS/CSMS Operations Scenarios for the ECS Project
607-CD-001	ECS Maintenance and Operations Position Descriptions
152-TP-001	ACRONYMS for the EOSDIS Core System (ECS) Project
152-TP-003	Glossary of Terms for the EOSDIS Core System (ECS) Project
211-TP-005	Transition Plan 4PX to 4PY, 4PY to 5A, and 5A to 5B for the ECS Project
220-TP-001	Operations Scenarios - ECS Release B.0 Impacts
500-1002	Goddard Space Flight Center, Network and Mission Operations Support (NMOS) Certification Program, 1/90
535-TIP-CPT-001	Goddard Space Flight Center, Mission Operations and Data Systems Directorate (MO&DSD) Technical Information Program Networks Technical Training Facility, Contractor-Provided Training Specification

Problem Management

Lesson Overview

This lesson will provide you with the complete process by which trouble tickets are submitted and updated. In addition, the lesson describes in general terms the processes by which problems submitted on trouble tickets are assigned priorities, investigated, and resolved.

Lesson Objectives

Overall Objective - The overall objective of the Problem Management lesson is for Maintenance and Operations (M&O) personnel to develop proficiency in the procedures that apply to the trouble ticketing/problem resolution process for the Earth Observing System (EOS) Data and Information System (EOSDIS) Core System (ECS).

Condition - The student will be given a written description of an operational problem (affecting ECS hardware, software, documentation, or procedures), access to the Trouble Ticketing System, a copy of 609-CD-600-001, *Release 6A Operations Tools Manual,* and a copy of 611-CD-600-001, *Mission Operation Procedures for the ECS Project*.

Standard - The student will use the Trouble Ticketing System without error in accordance with the prescribed process and procedures to submit, update and complete the specified parts of a trouble ticket.

Specific Objective 1 - The student will perform the steps involved in submitting a trouble ticket.

Condition - The student will be given a description of an operational problem to be reported through the Trouble Ticketing System, access to the Trouble Ticketing System (through a workstation or terminal), a copy of 609-CD-600-001, *Release 6A Operations Tools Manual,* and a copy of 611-CD-600-001, *Mission Operation Procedures for the ECS Project*.

Standard - The student will perform without error the steps involved in submitting a trouble ticket in accordance with the applicable procedure, including entry of information sufficiently accurate and complete to permit correct assignment of severity.

Specific Objective 2 - The student will perform the steps involved in making a change to an existing trouble ticket.

Condition - The student will be given a description of a change to be made to an existing trouble ticket, access to the Trouble Ticketing System (through a workstation or terminal), a copy of 609-CD-600-001, *Release 6A Operations Tools Manual,* and a copy of 611-CD-600-001, *Mission Operation Procedures for the ECS Project*.

Standard - The student will perform without error the steps involved in making a change to an existing trouble ticket in accordance with the applicable procedure.

Specific Objective 3 - The student will describe the general steps in the routine trouble ticket problem resolution process, including the differences that result from assignment of the various priority levels.

Condition - The student will be given a description of a routine operational problem to be resolved through the problem resolution process, a copy of 609-CD-600-001, *Release 6A Operations Tools Manual,* and a copy of 611-CD-600-001, *Mission Operation Procedures for the ECS Project*.

Standard - The student will state without error the general steps involved in the routine trouble ticket problem resolution process in accordance with the applicable procedure.

Specific Objective 4 - The student will describe the general steps in the process of liaison with the ECS System Operational Support (SOS) Help Desk and processing a trouble ticket through the problem resolution process.

Condition - The student will be given a description of an operational problem to be processed through the problem resolution process, a copy of 609-CD-600-001, *Release 6A Operations Tools Manual,* and a copy of 611-CD-600-001, *Mission Operation Procedures for the ECS Project*.

Standard - The student will state without error the general steps involved in the processing of an operational problem through the problem resolution process in accordance with the applicable procedure.

Specific Objective 5 - The student will describe the general steps in the process of making emergency fixes to operational problems.

Condition - The student will be given a description of an operational problem to be processed through the emergency fix process, a copy of 609-CD-600-001, *Release 6A Operations Tools Manual,* and a copy of 611-CD-600-001, *Mission Operation Procedures for the ECS Project*.

Standard - The student will state without error the general steps involved in making an emergency fix of an operational problem in accordance with the applicable procedure.

Importance

This lesson applies to students who will be internal users or operators of the ECS (including support staff). The lesson will provide them with the knowledge and skills needed for submitting trouble tickets and making additional entries on trouble tickets in the course of investigating ECS problems reported on trouble tickets. They will need the knowledge and skills on the job when they encounter ECS hardware, software, documentation or procedural problems that they cannot readily fix, that affect other users/operators, or that are system-wide problems. The lesson describes why and how trouble tickets are submitted and updated. In addition, it describes in general terms the processes by which problems submitted on trouble tickets are assigned priorities, investigated and resolved. Consequently, the students will become aware of what happens to the trouble tickets they submit and how clear and complete inputs to the SOS Help Desk ensure the greatest effectiveness of support in problem resolution.

Writing a Trouble Ticket (TT)

Purpose and Functions of Trouble Tickets

A trouble ticket (TT) is an electronic document that serves the following purposes:

- reporting/recording problems.
- recording an idea for a system enhancement.

The problems reported most frequently affect the following ECS components:

- hardware.
- software.
- technical documents.
- procedures.

Trouble tickets that are used for recording an idea for a system enhancement are considered by the Sustaining Engineering organizations either at the Distributed Active Archive Centers (DAACs) or at the ECS Sustaining Engineering Organization (SEO).

Trouble tickets may be submitted by:

- users in the science community.
- ECS operators.
- developers using ECS.

Trouble tickets have several possible states:

- New.
- Assigned.
- Solution Proposed.
- Implement Solution.
- Solution Implemented.
- Closed.
- Forwarded.
- Work Around.
- Not Repeatable.

A local trouble ticket is "open" (in process) until the problem has been resolved and the problem resolution has been officially approved. Then the trouble ticket is "closed." A local trouble ticket may be closed by assignment of the problem to resolution processes at the ECS SOS/SEO.

Problems which require changes that could have significant effects on the ECS configuration (e.g., change of a baselined Configuration Parameter) must be referred to the configuration management process. If the TT investigation indicates that a configuration change is required to solve a problem or to develop an enhancement, the subject of the TT becomes a configuration management issue and a Configuration Change Request (CCR) is prepared.

- A CCR provides documentation of the configuration management process by which changes to ECS configuration items (CIs) or configuration controlled items are approved and implemented.

- A trouble ticket leads to a CCR only when a configuration change is proposed.

The ECS Trouble Ticketing System provides a consistent means of…

- reporting ECS problems.

- classifying problems.

- tracking the occurrence and resolution of problems.

The Trouble Ticketing System is managed by a computer software package called Remedy. Remedy's Action Request System provides a distributed Trouble Ticketing System that furnishes ECS centers (e.g., System Monitoring and Coordination Center (SMC), DAACs) with a common means of classifying, tracking, and reporting both the occurrence of problems and their resolution to ECS users and operations personnel. The Trouble Ticketing System performs the following functions:

- Provides a graphical user interface (GUI) that provides operations personnel with access to all trouble ticketing systems.

- Provides a common trouble ticket entry format.

- Stores trouble tickets.

- Retrieves trouble tickets upon request.

- Allows operations personnel to forward problem reports from one ECS center to another.

- Produces stock and common reports on ECS problems.

- Provides interfaces with users' and operators' e-mail to provide automatic notification of events that affect a trouble ticket (such as logging in of a newly submitted trouble ticket or "close-out" (completion) of a trouble ticket).

- Offers an application programming interface through which ECS computer programs can automatically submit trouble tickets.

- Provides summary information to the SMC from each DAAC to allow SMC personnel to prepare trend reports on ECS problems.

- Defines a consistent "life cycle" (from submittal to completion) for trouble tickets.

- Allows each ECS center to customize local trouble ticket escalation and action rules.

  - Escalation rules are time-activated events.

  - When a trouble ticket meets whatever conditions are specified in the rules, the Trouble Ticketing System takes the designated action. For example:

    - notification (of either a user or support staff member).

    - writing to a log file.

    - setting a field value on the trouble ticket.

    - running a custom-written process.

In addition to the functions performed by Remedy's Action Request System, the Trouble Ticketing System provides other methods of submitting and/or keeping track of trouble ticket status.

- set of custom hypertext markup language (HTML) documents.

  - allow registered users to submit new trouble tickets and determine the current status of any of their previous trouble ticket entries via the Internet.

- text e-mail template.

  - allows automated entry of trouble ticket information.

- contacting a User Services representative at one of the DAACs.

  - by telephone.

  - in person.

In addition to tracking trouble tickets, the Remedy Action Request System provides a User Contact Log for User Services representatives.

- There is a separate schema (GUI) that accepts the entries which User Services personnel enter for each contact they have with ECS users.

- A button on the User Contact Log schema allows the User Services representative to automatically fill out a new trouble ticket simply by clicking on the button.

  - Clicking the button transfers data from the contact log to the appropriate fields on a trouble ticket form.

Writing/Submitting Trouble Tickets

The particular method that a person who is submitting a trouble ticket uses depends on whether the person submitting the trouble ticket is an internal or external user of ECS.

- External users submit trouble tickets either through the HTML documents, e-mail template, or by contacting User Services.

- Internal operators and users of ECS submit trouble tickets using the Remedy Action Request System.

Because this course is intended for ECS personnel, only the internal method (using Remedy) is described in this lesson.

The Trouble Ticketing System is wholly automated.

- TTs are handled electronically.

  - Common distributed-access database system.

  - Remedy is the Trouble Ticket database tool at the sites.

- Supporting documentation for a trouble ticket must be handled separately.

  - It is not possible to attach a file in Remedy.

  - Supporting documentation in electronic form (e.g., computer files) must be sent to the local Trouble Ticketing System database administrator. (Attach an e-mail message identifying the corresponding trouble ticket number, submitter identification and any other relevant information.)

  - Trouble Ticketing System database administrators:

    · SMC Configuration Management (CM) Administrator

    · SEO Operations Readiness and Performance Assurance Analyst

    · DAAC Operations Readiness and Performance Assurance Analyst

  - Supporting documentation **not** in electronic form (if any) is handled by the local Trouble Ticketing System database administrator and is listed as an attachment to the trouble ticket.

The procedure for writing and submitting a trouble ticket is performed by any internal ECS user or operator who needs to submit a trouble ticket to have an operating problem investigated. The procedure starts with the assumption that the applicable servers are running and the user or operator has logged in to ECS.

Access to Remedy is gained through the use of UNIX commands, as reflected in the following procedure for launching Remedy. This procedure is applicable for launching Remedy locally at a DAAC; developers or support personnel at the ECS Development Facility or at the SMC may need to use a different login procedure.

Launching Remedy Using UNIX Commands

1 Access the command shell.

- The command shell prompt is displayed.

NOTE: Commands in Steps 2 through 8 are typed at a UNIX system prompt.

2 Type **setenv DISPLAY** *clientname***:0.0** then press the **Return/Enter** key.

- Use either the terminal/workstation IP address or the machine-name for the *clientname*.

3 Start the log-in to the MSS client server by typing either **/tools/bin/ssh** *hostname* (e.g., **g0msh08**) and then press the **Return/Enter** key.

- If you receive the message, **Host key not found from the list of known hosts. Are you sure you want to continue connecting (yes/no)?** type **yes** ("**y**" alone does not work) and then press the **Return/Enter** key.

- If you have previously set up a secure shell passphrase and executed **sshremote**, a prompt to **Enter passphrase for RSA key '***<user@localhost>***'** appears; continue with Step 5.

- If you have not previously set up a secure shell passphrase; go to Step 6.

4 If a prompt to **Enter passphrase for RSA key '***<user@localhost>***'** appears, type your *Passphrase* and then press the **Return/Enter** key. Go to Step 7.

5 At the *<user@remotehost>***'s password:** prompt, type your *Password* and then press the **Return/Enter** key.

6 Type **cd /***path* then press the **Return/Enter** key.

- Change directory to the directory (e.g., /usr/ecs/*mode*/COTS/remedy/bin) containing the Remedy command files.

- The *mode* will most likely be one of the following operating modes:

    - OPS (for normal operation).

    - TS1 (for testing).

    - SHARED (for other uses).

- Note that the separate subdirectories under /usr/ecs apply to different operating modes.

7 Type **aruser &** then press **Return/Enter**.

- The Remedy Action Request System Main User Tool window appears on the screen.

The basic steps of the procedure for writing a trouble ticket are as follows (the sequence of Steps 4 - 6 is not critical):

Writing a Trouble Ticket

1 If the schema in the Action Request System window is anything other than the **RelB-Trouble Tickets** schema (Figure 1), select **File→Open Schema** from the pull-down menu and select the **RelB-Trouble Tickets** schema.

- The **Open Schema** window (Figure 2) appears.

Figure 1. Release B Trouble Tickets Schema

625-CD-503-003

Open Schema

Available Schemas

```
Group  (t1msh01)
RelB-Contact Log  (t1msh01)
RelB-Hardware Information  (t1msh01)
RelB-Menu-Closing Codes  (t1msh01)
RelB-Menu-Hardware Resources  (t1msh01)
RelB-Menu-Key Words  (t1msh01)
RelB-Menu-NotifyGeneral  (t1msh01)
RelB-Menu-Problem Type  (t1msh01)
RelB-Menu-Software Resources  (t1msh01)
RelB-Software Information  (t1msh01)
RelB-TT-ForwardToSMC  (t1msh01)
RelB-TT-ForwardToSMCOld  (t1msh01)
RelB-TT-ForwardToSite  (t1msh01)
RelB-TT-NSI  (t1msh01)
RelB-TT-Sites  (t1msh01)
RelB-TT-Times  (t1msh01)
RelB-Trouble Tickets  (t1msh01)
SBenSchm  (t1msh01)
Test Schema  (t1msh01)
Test Schema 2  (t1msh01)
Trouble-Ticket-Xfer  (t1msh01)
User  (t1msh01)
```

* indicates a server that is not reachable

Selection

[Apply]   [Dismiss]

Figure 2. "Open Schema" Window (Not all choices may appear.)

2   Click on **RelB-Trouble Tickets** in the **Open Schema** list of schemas to highlight it.

3   Click on the **Apply** button in the lower left-hand corner of the **Open Schema** dialog box.

- The **RelB-Trouble Tickets** schema (Figure 1) is displayed.
    - Allows operations personnel access to TTs for purposes of submitting, reviewing, or modifying them.

4   Select **File→Open Submit** from the pull-down menu.

- The **Submit** GUI (Figure 3) is displayed.

- **Submit** resembles the **RelB-Trouble Tickets** schema except for an **Apply** button in the lower left-hand corner and a **Dismiss** button in the lower right-hand corner.

Figure 3. "Submit" Window

5   Type a short description of the problem (up to 128 characters) in the **Short Description** field; try to capture the essence of the problem in a few words.

- **Short Description** is a mandatory entry.

- The **Short Description** field and some other fields have a document icon associated with them so you can click on the icon and open a window in which you can type information at length.

6   Place the mouse cursor on the **Submitter ID** pick-list icon. Press the left mouse button and move the cursor down the list until your ID is highlighted; then release the mouse button to transfer your ID into the **Submitter ID** field.

- Remedy will automatically fill in the following fields when you actually submit the TT:

    – Submitter Name.

    – Submitter Phone [number].

    – Submitter eMail [address].

    – Submitter Home DAAC.

- If your name is not on the pick-list, you must type the information in all of the preceding fields.

- If you have any questions concerning what should be entered in any of the identification fields, ask the Trouble Ticketing System database administrator.

7   Click and **hold** on the **Submitter Impact** option button to display a menu of "impacts."

- The following menu of impact codes is displayed:

    – High.

    – Medium.

    – Low.

- **Submitter Impact** is an optional field, but is used to indicate problem severity.

- Default value (**Low**) is set automatically if you do not make a selection in this field.

8   Select the desired impact code by moving the cursor to the desired code in the menu to highlight it, then release the mouse button.

- Selected code is displayed on the **Submitter Impact** option button.

9   Fill in the any of the following optional fields which provide useful information for the problem investigation:

- **Long Description** (description of the problem using up to 4060 characters). This is the place to provide data on frequency of occurrence, time and people required for recovery/workaround, impact on daily/weekly quotas, and how soon the fix is needed.

- **Key Words** (up to 255 characters). ECS required; enter the mode and release (e.g., **OPS:6A.02**).

- **Software Resource** (software with which the problem originated).

- **Hardware Resource** (hardware from which the problem came).

10 When you are satisfied that the information in the trouble ticket fields is correct, click on the **Apply** button in the lower left-hand corner of the **Submit** GUI to submit the TT.

- TT is entered into the Remedy database.

- A message should appear at the bottom center of the form notifying you that the TT has been successfully submitted.

  – Trouble ticket identification number is included in the message.

- Remedy will send you an e-mail message to confirm that the trouble ticket has been entered into the database.

  – If you do not receive confirmation, you should contact the Trouble Ticketing System database administrator.

11 To exit from the **Remedy Action Request System** first click on the **Dismiss** button in the lower right-hand corner of the **Submit** GUI.

12 Select **File→Exit** from the pull-down menu.

13 If it is necessary to provide back-up information/documentation, such as a file that illustrates the problem, send the documentation to the Trouble Ticketing System database administrator.

- Send an e-mail cover message that contains the following information:

  – Trouble ticket number (Ticket-Id).

  – Submitter ID.

  – Relevant information concerning the attachment.

Documenting Changes

Reviewing and Modifying Trouble Tickets

Trouble tickets must be modified as the problem resolution process progresses and the various parties involved in the process have to make entries on the trouble ticket, for example:

- assignment to a technician for problem resolution.
- resolution log entries.
- changes of status.
- forwarding to another site.

The changes are the result of better understanding of the nature of problems, proposed and revised solutions resulting from the investigation, or Trouble Ticket Review Board decisions.

Access to trouble ticket data is controlled by the database administrator for the Trouble Ticketing System. The database administrator assigns each user of Remedy's Action Request System certain access privileges.

- Access privileges determine which trouble ticket fields (if any) you can modify.
- Examples:
  - Some operators will be allowed only permission to submit TTs.
  - Operations Supervisor must be able to submit TTs, modify ticket status, assign priority, assign the TT to a specific investigator, and make many other modifications.

The basic steps of the procedure for reviewing or modifying TTs through Remedy are as follows:

Reviewing and Modifying Open Trouble Tickets

1   Access the **Remedy User Tool** by performing the Launching Remedy Using UNIX procedure defined earlier in this lesson.

- The Remedy Action Request System Main User Tool window appears on the screen.
- Either the last schema that was open or a blank **RelB-Trouble Tickets** schema (Figure 1) is displayed.

2   If the schema in the Action Request System window is anything other than the **RelB-Trouble Tickets** schema (Figure 1), select **File→Open Schema** from the pull-down menu.

- The **Open Schema** window (Figure 2) appears.

3   Select (highlight) **RelB-Trouble Tickets** from the **Open Schema** list of schemas.

4   Click on the **Apply** button in the lower left-hand corner of the **Open Schema** dialog box.

- The **RelB-Trouble Tickets** schema (Figure 1) is displayed.

5   If the trouble ticket to be modified has some characteristic that will allow you to restrict the system's querying of the database, enter the data in either the corresponding field on the **RelB Trouble Tickets** schema or in the **Query** field at the bottom of the form.

- For example, you may restrict querying to only those trouble tickets that have a high assigned priority and have been submitted within the last three days.

6   Follow menu path **Query→List**.

- The **Query List** dialog box (Figure 4) is displayed.
    - contains a list of trouble tickets.
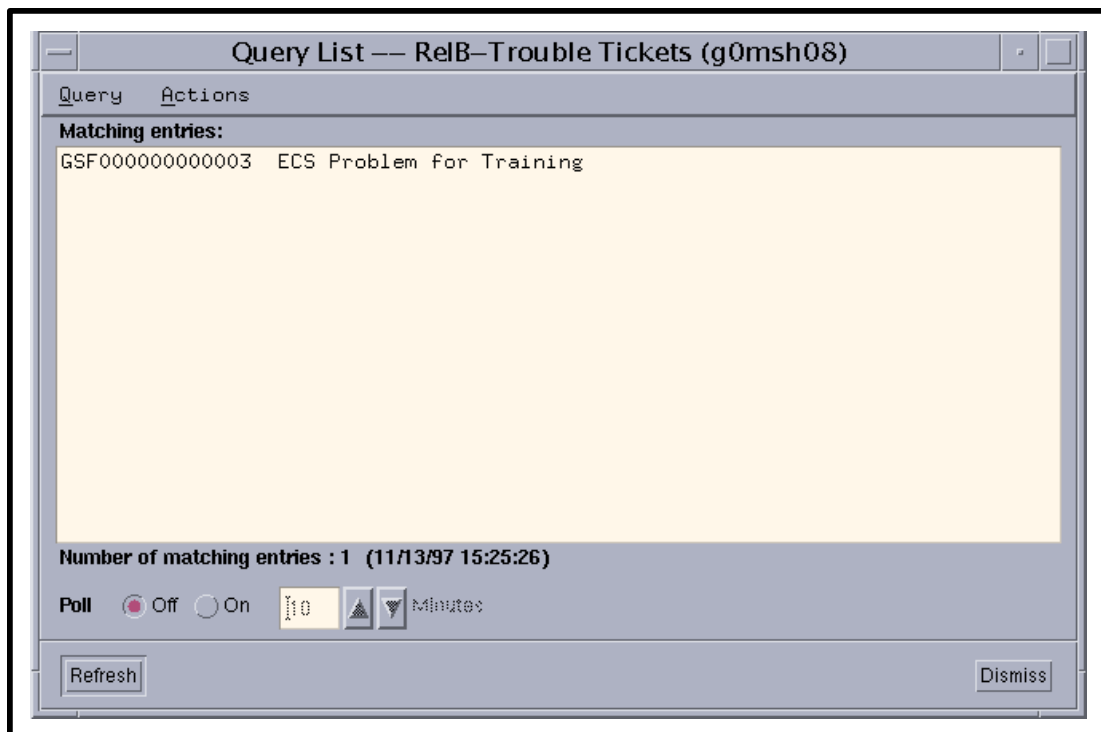
Figure 4.   Query List Dialog Box

7   Select (highlight) the specific trouble ticket(s) that you would like to review/modify.

8   In the **Query List** dialog box, follow menu path **Query→Modify Individual**.

- Use **Modify All Selected** (rather than **Modify Individual**) *only* if you wish to make *exactly* the same changes to a group of highlighted TTs.

- The **Modify Individual** GUI is displayed.

  – resembles the **RelB-Trouble Tickets** schema except for an **Apply** button in the lower left-hand corner and a **Dismiss** button in the lower right-hand corner

  – current trouble ticket data appears in the fields on the trouble ticket form.

9   Review and/or modify the trouble ticket fields as necessary.

- The fields are described in Table 1 (extracted from 609-CD-600-001, *Release 6A Operations Tools Manual*.)

- Some of the fields (e.g., **Submitter ID**, **Assigned-To**, **Closing Code**) have pick-list icons associated with them so you can click on the pick-list icon and highlight the text to be entered in the field.

- Some of the fields (e.g., **Detailed Resolution Log**, **History**) have diary or document icons so you can open a window in which you can type information at length.

10   If you wish to forward the TT to another ECS center, you must first click on the **Ticket Status** option button and select **Forwarded** from the option menu.

- You must be authorized to forward TTs.

11   When forwarding a TT to another ECS center, select the TT's destination using the **Forward-to** field pick list then click on the **Forward** button.

- Be sure to go to the next step (applying the change) or there will be no local record that the TT was forwarded.

- If you forward a TT to another center, it will receive a new **Ticket-Id** at that center and the original identifier will be transferred to the **Unique-Identifier** field.

- The TT will retain its original **Ticket-Id** at your center.

12   When you are satisfied that the information in the trouble ticket fields is correct, click on the **Apply** button to make the changes effective.

13   To exit from the Remedy Action Request System first click on the **Dismiss** button in the lower right-hand corner of the **Modify Individual** GUI.

14   Select **File→Exit** from the pull-down menu.

Table 1. Trouble Ticket Field Description

Field Name	Data Type	Size	Entry	Description
Ticket-Id	Character	15	System generated	Ticket number which is set and maintained by the system.
Ticket Status	Selection	*	Required	Status of the trouble ticket.
Assigned-Priority	Selection	*	Required	Priority of trouble ticket assigned at the site (HIGH, MEDIUM, LOW).
Short Description	Character	128	Optional	Short description of the problem.
Submitter Impact	Selection	*	Required	Impact of the problem to the submitter.
Long-Description	Character	4060	Optional	Long description of the problem.
Resolution Log (End User Sees)	Diary	Unlim	Optional	General steps in the resolution of the problem.
Detailed Resolution Log	Diary	Unlim	Optional	Detailed steps in problem resolution.
Submitter ID	Character	30	Required	User Id of the Submitter.
Submitter Name	Character	30	Optional	Full Name of the Submitter.
Submitter Phone	Character	30	Optional	Phone number of the Submitter.
Submitter eMail	Character	64	Optional	E-mail address of the Submitter.
Submitter Home DAAC	Character	60	Optional	Home DAAC of the Submitter.
History	Diary	Unlim	Optional	Upon submission or modification, the person assigned to the ticket and the ticket status will be indicated in the History field. Due to a limitation in Remedy, this information will only be written when the Assigned-to and Status fields are modified.
CI	Character	30	Optional	Name of the configuration item to which the problem is associated.
Assigned-To	Character	30	Optional	Person to whom Trouble Ticket has been assigned.
Last-modified-by	Character	30	System generated	Person who last modified the Trouble Ticket.
Create-date	Date/Time	17	System generated	Date and time Trouble Ticket was created at the present site (mm/dd/yy hh:mm:ss).
Last-Modified-date	Date/Time	17	System generated	Date and time the trouble ticket was last modified (mm/dd/yy hh:mm:ss).
Related CCR	Character	60	Optional	ID of a related CCR. [If more than one CCR, separate CCRs by a space for readability.]
Key Words	Character	255	Optional	Key words to help identify this Trouble Ticket.
Problem Type	Character	30	Optional	Type of problem addressed by this Trouble Ticket.
Closing Code	Character	60	Optional	Code assigned to the type of problem that necessitated the writing of this Trouble Ticket.
Closed-by	Character	60	Optional	Person who closed this Trouble Ticket.

625-CD-503-003

Table 1. Trouble Ticket Field Description

Field Name	Data Type	Size	Entry	Description
Close-date	Date/Time	17	Optional	Date and time this Trouble Ticket was closed (mm/dd/yy hh:mm:ss).
Software Resource	Character	60	Optional	Software resource that the problem came from.
Hardware Resource	Character	60	Optional	Hardware resource that this problem came from.
Duplicate Master Id	Character	25	Optional	The Ticket-ID of the primary Trouble Ticket for the problem reported in this Trouble Ticket and its associated duplicate Trouble Tickets (other tickets reporting the same problem).
Forward-to	Character	60	Optional	Site that this Trouble Ticket was last forwarded to.
Forwarded-from	Character	60	Optional	Site that forwarded this Trouble Ticket.
Forwarded-by	Character	60	Optional	Contact person at the forwarding site.
Forward-date	Date/Time	17	Optional	Date and time Trouble Ticket was forwarded (mm/dd/yy hh:mm:ss).
Unique-Identifier	Character	20	Optional	Unique identifier which is established at the origination site. This identifier should NEVER be changed once set.
Forwarded-to-1	Character	60	Optional	First site to have been forwarded this Trouble Ticket.
Forwarded-to-2	Character	60	Optional	Second site to have been forwarded this Trouble Ticket.
Forwarded-to-3	Character	60	Optional	Third site to have been forwarded this Trouble Ticket.
Forwarded-to-4	Character	60	Optional	Fourth site to have been forwarded this Trouble Ticket.
Associated Contact Log Id	Character	30	Optional	ID number of the associated Contact Log entry for this Trouble Ticket.

*Note, the size of a field with a "selection" data type can vary and the size is automatically adjusted to the size of the item selected from the selection list.

In addition to the fields described in the preceding table, the **RelB-Trouble Tickets** schema provides the following active links:

- **Forward**—Forwards the trouble ticket to the site specified in the **Forward-to** field (**Ticket Status** field must be set at **Forwarded**).

- **Hardware Information**—Opens a window that is associated with the trouble ticket to hold hardware information.

- **List All Masters**—All trouble tickets that are duplicates of each other have one master. This button lists all master trouble tickets.

- **List This TT's Duplicate(s)** -- List all trouble tickets that are duplicates associated with this trouble ticket.

- **Go to Contact Log** -- If the trouble ticket was created from a contact log (User Services), then this button opens a window to that contact log.

Problem Resolution

Overview of Problem Resolution

- Every trouble ticket (TT) is logged into the Remedy database for record-keeping purposes.

- Each TT is evaluated first at the local center to determine the severity of the problem and to assign on-site responsibility for investigating the problem.

- TTs that can be resolved locally are assigned and tracked at the local center.

- areHigh-severity problems (or those associated with installation) are called in to the SOS Help Desk and escalated to the agenda of the Problem Review Board (PRB).

  - sponsored by the Maintenance & Operations (M&O) organization.

  - held daily.

  - functions as the problem review forum for ECS failures/malfunctions.

  - participants discuss TTs referred from the sites to the System Monitoring and Coordination Center (SMC) and coordinate NCR activities within the M&O organization as well as with development, customer, and user organizations.

The PRB review processes are the principal topics of a separate section of this lesson.

Problem Severity Rating

The Remedy Trouble Ticket application provides fields for rating the "Submitter Impact" and "Assigned-Priority" of a problem. It is intended that the submitter of a trouble ticket use the Assigned Impact field to rate the severity of the problem. The Assigned-Priority rating may be used at the DAAC for those problems that will be handled locally, but is typically reserved for use by SOS Help Desk staff in assigning priorities for handling problems referred to them. To assign priorities, the Help Desk considers numerous factors relating to the severity of problems referred from all sites. Thus, the importance of the impact/severity rating for effective handling of the problem cannot be overstated. The submitter must examine and document the impact carefully, and when a Trouble Ticket is referred to the SMC/SOS Help Desk, the Operations Supervisor must verify that the impact is completely and accurately documented.

If there is an incorrect assignment of impact/severity, the problem resolution process will be adversely affected. Certainly, most submitters would expect that if the problem is assigned an incorrectly low impact/severity rating, its resolution might be delayed because the problem would be given insufficient priority and attention. But incorrect assignment of high impact/severity ratings also has negative effects. A problem with an incorrect high rating may be given initial attention and priority at the expense of other problems that should be given higher priority. Therefore, another problem even at your own site that should be given priority may not get the attention it should, reducing the overall productivity and performance of your system. If the problem is referred to the SOS Help Desk and is incorrectly given priority at the ECS Development Facility, development activities that should have higher priority may be deferred and development/support resources may be diverted, reducing the timeliness or readiness of new software deployments for your site.

As a minimum, the information provided (usually in the Long Description field of the Trouble Ticket) must include:

- How often does this problem happen? (How many times per hour/day/week?)

- How long does it take to recover (or CANNOT RECOVER) or conduct workaround (in minutes or hours)?

- How many people are required to accomplish recovery or workaround?

- What is the impact on daily/weekly quotas? (i.e., How many Ingest/Production/ Distribution granules are not achieved, out of the total load?)

Complete and accurate documentation of the impact/severity will help ensure that problems forwarded to the SMC/SOS Help Desk are assigned correct priorities, and that when they are forwarded to the NCR software application for handling by Sustaining Engineering/ Development they will be correctly categorized.

As reflected in a prior section and procedure on writing a Trouble Ticket, when initially submitted, problems are classified by the submitter into one of three categories based on perceived impact: *high*, *medium*, or *low*. Review by the SOS Help Desk and Problem Review Board results in assignment to one of three priority categories: **high**, **medium**, or **low**, in the

context of other submitted trouble tickets, assessed severity, availability of workaround, and consequences of the problem. These priority categories are approximately equivalent to categories specified in the Performance Assurance Requirements document [*EOS Performance Assurance Requirements for ECS,* Goddard Space Flight Center (GSFC) 420-05-03]. Table 2 shows the categories identified in the Performance Assurance Requirements and specific definitions applied by M&O and the SOS Help Desk to assign priorities. The table also illustrates that M&O and the Problem Review Board may further characterize low priority problems with additional classifications, as the problems are documented in *non-conformance reports* (NCRs) for resolution by the Sustaining Engineering Organization (SEO).

Table 2. Trouble Ticket Priorities

As Documented in NASA 420-05-03	As Used/Interpreted by M&O
Category 1: System/Service cannot perform critical function or imposes major safety hazard. (Priority 1) Presents an immediate impact to development, operations, services, or data processing functions; imposes major safety hazard to personnel, systems, or space mission resources; or results in loss of one or more essential mission objectives.	**HIGH (Severity 1)**: An NCR which causes: – Inability to perform a mission-critical function (i.e., Ingest/Pre-Processing/Archiving of Science Data, Planned Processing, Browse/Order/Distribute); – Performance of a mission-critical function to be so degraded that production minimum goals cannot be achieved; – A mission-critical function to be performed improperly, resulting in permanent loss of data; *and* for which no workaround exists *or* for which no workaround can be accommodated by DAAC operators given a detailed workaround procedure is documented but the procedure is inadequate based upon the complexity of the procedure, the abilities of an adequately trained and experienced operator, or both.
Category 2: System/Service substantially impaired. (Priority 2) Substantially impacts development, operations, services, or data processing functions; fails to operate within critical performance specifications; or cannot effectively or efficiently fulfill baseline requirements.	**MEDIUM (Severity 2)**: An NCR with the consequence that: – The performance of a mission-critical function is degraded and may prevent achieving production minimum goals; – A mission-critical function can be only partially performed, or performs improperly, resulting in temporary loss of data or incorrect data results; – A situation (actually or potentially) severely compromises ECS mission readiness or operational integrity; – A condition exists to produce a severely degraded mission-critical function, but a workaround will allow operations to continue temporarily without permanent loss of data or severely impaired performance/workload/schedules.
Category 3: System/Service slightly impaired. (Priority 3) Causes minor or no substantial impact to development, operations, services, or data processing functions. Support may be degraded, but mission can still be accomplished.	**Severity 3**: An NCR with the consequence that: – A non-critical mission function (e.g., Advertising) cannot be performed, or yields incorrect results; – Unexpected events occur which can be corrected using normal operational procedures with minimal impacts to performance/workloads/schedules – A condition exists to produce a degraded mission-critical function, but a workaround will allow operations to continue indefinitely without severely impaired performance/workload/schedules.
	Severity 4: Improvement (Nuisance; e.g., a typo).
	Severity 5: Enhancement (Identified for next release).

Local Trouble Ticket Review Board

Each site establishes its own TT Review Board (TTRB). The TTRB considers the problem and proposed solution for each TT that is referred to it.

- TTRB reviews/approves/modifies priorities that are assigned locally by the Operations Supervisor based on perceived impact.

- The TT tool (Remedy) uses the priority codes **high, medium,** and **low**.

- The TT Review Board may suggest, comment, reject, approve or otherwise recommend actions as the board deems appropriate (within the limits of its authority).

- All **high** severity trouble tickets are referred to SOS Help Desk and the SMC and ultimately to the Problem Review Board. It is important for the local TT Review Board to ensure that all TTs are written accurately and completely to facilitate handling by the SMC/SOS; TTs refereed or forwarded may be rejected if they are incomplete or inaccurate (e.g., reflect high severity/impact without full documentation).

- Problems assigned a **medium** priority rating are usually resolved by the local TTRB.

  – resolution may be brought to the attention of the SOS Help Desk/Problem Review Board for "advice and acknowledgment."

- **Medium-** and **low-**priority trouble tickets can often be handled locally unless they affect more than one site.

- Problems that affect multiple sites are forwarded to the SMC.

- If the resolution of a TT entails a system enhancement and therefore involves a configuration change (as determined by the board), the TT Review Board generates a Configuration Change Request (CCR).

  – problem (CCR) is entered into the Change Request Manager (Distributed Defect Tracking System—DDTS) and is directed through the configuration management process, including review by the Configuration Control Board.

- For a TT forwarded to SMC and the SOS Help Desk/Problem Review Board, if resolution results in correction of a system non-conformance, it is likely to become part of a software patch.

- If the resolution of a TT does not involve a configuration change and can be handled locally, the TT Review Board issues implementing instructions.

- After the problem has been corrected and the fix has been verified through testing, the TT Review Board orders the TT database administrator to close the trouble ticket.

Problem Resolution Process

The steps of the general problem resolution process are based on those depicted in the Maintenance & Operations Problem Management Concept. The steps provide an outline of an average **routine** TT's life cycle.

Emergency fixes of problems that would prevent operation of the ECS (especially high-severity problems) may, under some circumstances, be made through a somewhat abbreviated process. However, proper follow-up procedures must be followed to ratify the emergency action. (This lesson includes a separate section on Emergency Fixes.)

Figure 5a and Figure 5b illustrate the local problem resolution process.

Figure 5a. ECS Local Problem Management Concept, Part I

Start

1 Problem Identified
Operator/User
- May be H/W, S/W, or procedural
- User notifies User Services or
- Operator encounters problem

2 Problem Documented
User Services/Operator/User
- Describes problem, circumstances, ops impacts and any immediate actions on Trouble Ticket (TT) electronic form
- Forwards to Ops Supervisor

3 High severity problem requires rapid response (e.g., Loss of operational capability in critical operational period, DAAC cannot repair)? Yes / No

4 Call Help Desk
Ops Supervisor
- Call 1-800-ECS-DATA
- Support assigned developer personnel in troubleshooting and fault isolation

EDF Process

5 TT Logged, Numbered
Site CMO
- TT assigned number and logged in TT Master Database (DB) with status "New," administered, monitored, and reported by Site Configuration Management Office (CMO)

6 Trouble Ticket Assessment
Ops Supervisor/Resource Manager
- Reviews problem, impacts
- Assigns Ops priority and org responsible for investigation and resolution (Fields controlled by Ops Supervisor only)
- Changes TT status to "Assigned"
- Forwards to assign Site Org (e.g., Ops, Maint Engr, User Services)
- Reviews/modifies information
- Distribution List (based on priority & problem type, auto-selected from multi-list DB)

8 TT DB Update
Ops Supervisor/PI
- Update information to CMA TT Master DB
- Info copies distributed automatically on and off site

7 All Sites Notified
SMC, DAACs, EOC, EDF
- Review, respond with pertinent information, impacts

9 Problem Investigation
Assigned Site Org/Individual (PI)
- Org assigns individual as PI (Problem Investigator); PI name and contact info transmitted to CMA for TT Master update and distribution
- Analyzes problem to determine cause, internal/external impacts, ops workarounds, fix/resolution in consultation with vendors, developers, other orgs
- Updates TT with analysis data and proposed resolution (e.g., system operating per design spec.; recommended enhancement is ____; proposed CCR attached)
- Changes TT status to "Solution Proposed" and forwards to site CMA

ⓐ

Figure 5a. ECS Local Problem Management Concept, Part I

10 Trouble Ticket Adjudication
TT Review Board (TTRB) chaired by Site Sys. Engr. Mgr.
Reviews and adjudicates, e.g.:
- Approves closure/further action assignment
- Approves related CCR for submittal to CM process
- Approves reassignment of action off-site
- Site CMA closes or forwards

11 TTRB Support/TT Update
Site CM Administrator (CMA)
- Support TTRB (Agenda, Minutes)
- Notify distribution of TTRB updates; update Master TT

ⓐ

TT Status "Implement Solution"

TT Status "Closed"

19 Closure
CMA
- TT Master to file

12 Proposed change affects configuration-controlled item(s)? Yes / No

13 CCB Support
Site CMO
- Distributes CCR for Pre-CCB Review

14 Configuration Mgmt
Site CCB - chaired by Site Mgr
- Reviews CCR
- Rejects or approves for site implementation and/or forwards to higher level CCB

Rejected CCRs or Other Action Notification

End

Approved CCRs

16 Site Resolution
On-Site Actionee
- Implements any corrective action
- Arranges for/leads acceptance
- Obtains approvals
- Resubmits to TTRB

15 System or external elements involved? No / Yes

17 Escalation
SEO TTRB/CCB
- Review/revision for system-level effects
- Forwards to higher level CCBs as required for review/approval

18 Off Site Resolution
Off-Site Actionee
- Implements any corrective action (May be incorporated in future release)
- Forwards correction to Site Rep for acceptance process/testing
- Site Rep obtains approvals and resubmits to TTRB

TT Status "Solution Implemented"

CM Master TT Updated and Distributed (Distro)

CM Master TT Updated and Distributed (Distro)
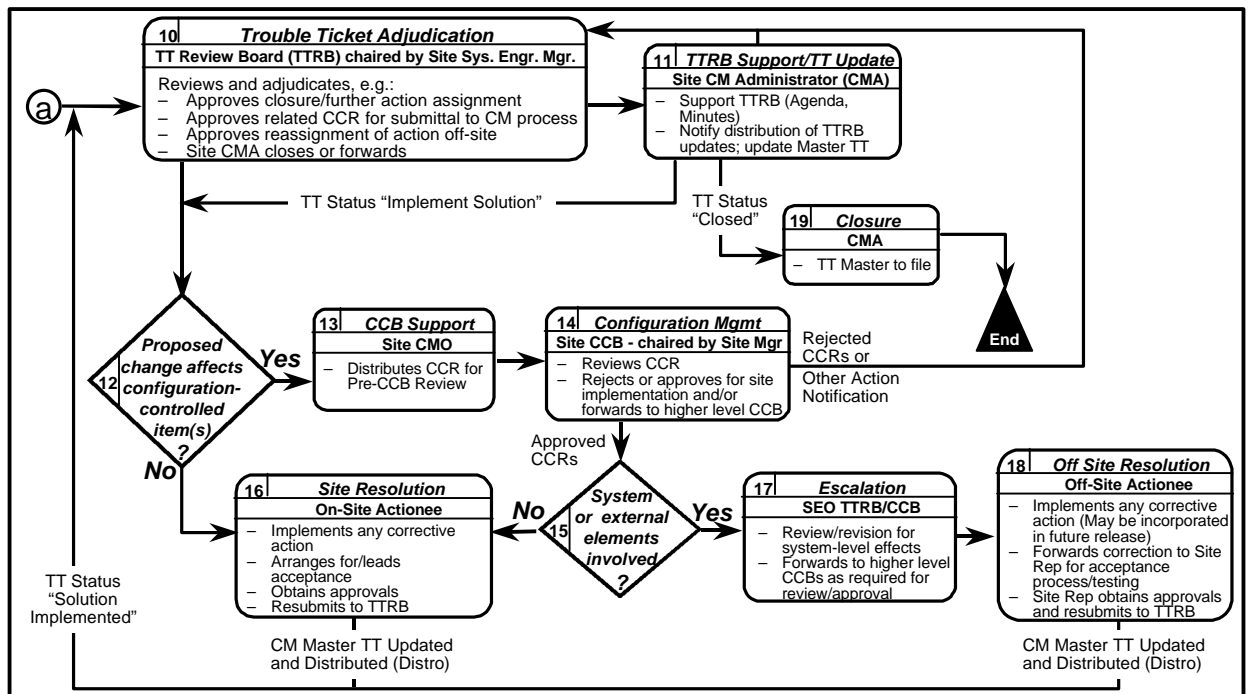
Figure 5b. ECS Local Problem Management Concept, Part II

The following procedure describes the steps of the process.

Local Problem Resolution

1   An ECS user or operator discovers a problem with ECS hardware, software, procedures, or documentation and decides to document this problem for investigation and resolution.

2   The user/operator, or, perhaps, at user request, User Services submits a TT as described in the Writing a Trouble Ticket section of this lesson.

3   The Operations Supervisor decides whether or not a rapid response is required (e.g., if there has been loss of operational capability in a critical operational period and the DAAC cannot repair the problem quickly without help).

4   In the event that rapid response is required, the Operations Supervisor calls the ECS Help Desk at 1-800-ECS-DATA; the ECS rapid response team assigns developer personnel to assist the site in solving the problem.

5   Otherwise, Remedy logs the TT into the system and assigns **New** in the **Ticket Status** field to initiate administration and monitoring by the Site Configuration Management Office (CMO).

6   The Operations Supervisor reviews the TT and assigns a priority (**High**, **Medium** or **Low**) in the TT **Assigned-Priority** field. The decision is based on the severity of the problem, including consideration of its frequency, availability of a workaround, time and resources required for recovery/workaround, and impact on daily/weekly quotas. The Operations Supervisor assigns the problem to a Problem Investigator (PI) organization, and changes the TT status to "Assigned."

7   The CM Administrator notifies all affected centers of the problem and requests their input to assist in assessing and resolving the problem.

   • There are two ways for a center to share TT information with another center.

      − forward the TT to the other center, resulting in the opening of a new TT there.

      − send the center's TT database administrator an e-mail message containing relevant information, in which case the problem can be reviewed without being logged in to Remedy.

8   The TT database administrator updates the TT database with inputs concerning the problem and how to resolve it.

9   The Problem Investigator coordinates inputs from the Sustaining Engineering Organization (SEO), developers, vendors, and external organizations concerning how to resolve the problem at the local level. If there are significant issues to be resolved, the Problem Investigator presents them at the Problem Review Board. When the Problem Investigator identifies a solution to the problem, he/she updates the TT and changes the status to **Solution Proposed** (**Ticket Status** field).

10   The TT Review Board (TTRB) (and the SOS Help Desk for High-severity problems) considers the proposed solution for approval, ratification, rejection, revision, closure or forwarding as applicable.

11   The TTRB is supported by the site Configuration Management Administrator (CMA). The CMA provides meeting support (Agenda, Minutes), and also notifies the distribution list of TTRB updates. The CMA also updates the Master TT in Remedy.

12   The TT Review Board decides whether the proposed change affects a configuration-controlled item and therefore needs to be referred to the CCB(s).

13   For a configuration issue (proposed change affects a configuration-controlled item), the site CMO distributes the Configuration Change Request (CCR) for pre-CCB review.

14   The CCBs may approve, reject, or revise the change proposal.

- TTRB is notified of results and reconsiders the TT accordingly.

15   The site CCB decides whether system-wide or external elements are involved, necessitating referral to a higher level CCB.

16   The TTRB may approve the implementation of changes that do not affect configuration-controlled items.

- If they approve the solution, they direct the CM Administrator to change the TT status to **Implement Solution**.

    − When the person assigned to correct the problem has done so, he/she changes the TT status to **Solution Implemented**.

- Emergency fixes can be made and then, if necessary, reported to the CCB after the crisis has been resolved.

- If the TT resolution involved temporary changes, the Maintenance Engineer updates the Baseline Manager.

17 If external elements (e.g., communication networks) are involved and/or a CCR is escalated, the off-site problem resolution process is initiated through the SOS Help Desk, which may also revise the on-site proposed solution if there are any system-level effects. This is part of the escalation process, which also includes submitting CCRs to higher level CCBs if necessary.

- If a permanent change is proposed, a Configuration Change Request (CCR) is submitted to either the on-site or system-level Configuration Control Board (CCB) as appropriate.

18 Off-site resolution may include corrective action incorporated in a future release.

- When the person assigned to correct the problem has done so, the TT status is changed to **Solution Implemented**.

19 After the solution has been implemented and the results have been verified and approved by the TT Review Board, the CM Administrator closes the TT (changes TT status to **Closed**).

Process for TT/NCR Resolution at EDF

For Trouble Tickets that are referred to the SMC and/or SOS Help Desk, a systematic process is initiated to apply necessary sustaining engineering and development resources at the EDF to the resolution of problems. The EDF process is structured to foster the optimum responsiveness to DAAC, test, development, and science problems. It operates with goals that include:

- consistent application of the definitions of problem severity across the program.

- minimized time between problem discovery and entry of the problem as an NCR with a correctly assigned severity

- access to all needed problem data in one source (the NCR application DDTS, to be replaced by an upgraded version of Remedy)

- development, science, test, and support resources focused for most effective and productive responsiveness to dynamically changing program priorities.

- collection of data on the process to assess and respond to measurement of how effective it is.

Figure 6 illustrates the process for TT/NCR resolution at EDF. (Note: The figure indicates use of the DDTS application to record NCRs for problem management at EDF; this application is to be replaced by an upgraded version of Remedy.)
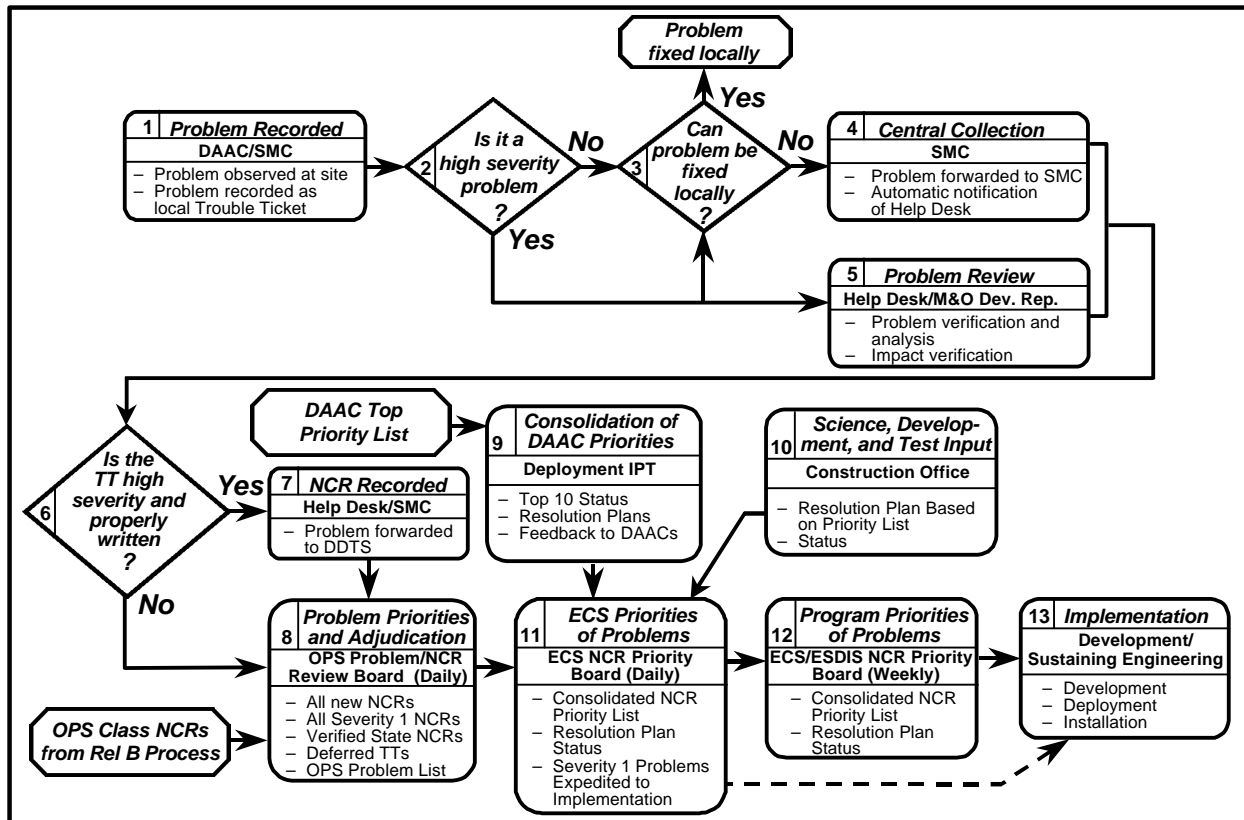
Figure 6. Process for TT/NCR resolution at EDF

The following procedure describes the steps of the process at EDF. The procedure and Figure 6 begins with a problem discovered at a site, although it includes problems that originate in development or test activities at EDF. The details of the local site problem handling are addressed in a previous section of this lesson. The details of problem origination in development or test activities are not shown or addressed in this lesson.

Process for TT/NCR Resolution at EDF

1 A problem is initially discovered and recorded as a Trouble Ticket at a DAAC (or at SMC).

2 At the DAAC (or SMC), the Operations Supervisor assesses the severity of the problem.

- If it is judged to be a high-severity problem, or if it is an installation issue, it is called in to the SOS Help Desk.

3 At the site, an assessment is also made to determine whether the problem can be resolved locally.

- If the problem can be resolved locally, the local problem resolution processes described previously will apply. Otherwise, the TT is forwarded to the SMC.

4 When any DAAC submits a TT to the SMC, the SOS Help Desk is automatically notified.

5 The Help Desk reviews the problem and the severity recommended by the DAAC, ensuring that the severity recommendation is consistent with the impacts described in the TT (i.e., availability of a workaround, frequency of occurrence, possibility of recovery, time and resources required to recover or conduct a workaround, impact on daily/weekly quotas).

- The Help Desk verifies the severity rating, modifying it if necessary in accordance with the approved definitions (see Table 2).

- A development representative in M&O participates in the problem review process, verifying the severity ratings of any problems that originate in development and test activities. These problems are initially documented in the NCR application, DDTS.

6 The Help Desk determines if the problem is high severity and written properly to document the severity rating.

- High severity problems that are properly documented in the TT can be forwarded directly to DDTS for entry as an NCR.

- OtherTTs are deferred for consideration by the OPS Problem/NCR Review Board.

7 The Help Desk or SMC enters the problem into DDTS (to be replaced with an upgraded version of Remedy), with documentation of the current impact, any available workarounds, and recommended severity.

8 The OPS Problem/NCR Review Board (PRB) meets daily to set problem priorities, assign/review resolution responsibilities, and adjudicate OPS problems referred from the DAACs through the Help Desk (see subsequent section of this lesson for more on the PRB).

- The PRB is co-chaired by the M & O Organization and Development/Sustaining Engineering.

- The PRB reviews all new and Severity 1 NCRs, NCRs in the Verified state, and deferred TTs.

- The PRB coordinates and distributes the **OPS Problem List** to ECS Sustaining Engineering, the Deployment IPT, and the ECS/ESDIS NCR Priority Board for setting priorites, and to the DAACs for information.

9 The Deployment Integrated Product Team (IPT) tracks DAAC problem priorities (e.g., the DAAC Top 10 List) , monitors resolution status, and provides feedback to the DAACs.

- The Deployment IPT consolidates DAAC priorities for input to the ECS NCR Priority Board.

10 The Construction Office provides Science, Development, and Test inputs, prepares resolution plans based on priorities, and monitors the status of resolution efforts.

11 The ECS NCR Priority Board meets daily to review problems and resolution status, considering priorities for problems from the sites and from Development, in the context of program priorities to ensure optimum focus of development, science, test, and DAAC resources.

- The Board distributes the **Consolidated Priority List**, taking into consideration both Development and Operations problems and their priorities and impacts

- The ECS NCR Priority Board rovides input to the ECS/ESDIS NCR Priority Board.

- Severity 1 problems are expedited to development and sustaining engineering resources for implementation.

- Proposed solutions to out-of-scope problems are documented in CCRs and submitted to relevant Configuration Control Boards (CCBs) and those approved for implementation are included in the Consolidated Priority List.

12 ECS and ESDIS meet weekly as the ECS/ESDIS NCR Priority Board to review problems in the context of program priorities.

13 Development and Sustaining Engineering resolve problems and implement solutions through development, deployment, and installation activities in accordance with approved priorities.

Problem Resolution Scenario

There is a scenario in the *Release B SDPS/CSMS Operations Scenarios for the ECS Project*, 605-CD-002-001, March 1996, that illustrates the process for resolving a **routine** problem. The scenario describes the "life cycle" of a trouble ticket from the time the ticket is submitted through the process of resolving the problem.

The scenario begins when a registered ECS Science End User (the originator) discovers a significant problem and submits a trouble ticket. The scenario continues with the Operations Supervisor assigning the TT to the Maintenance Coordinator for review and analysis of the problem. Based on the analysis, a recommended solution is submitted to the TT Review Board. The TT Review Board and Chair approves the solution and directs the Maintenance Coordinator to implement the corrective action. Upon completion of the repair, the Maintenance Coordinator documents the corrective action and informs the TT Review Board for final approval and closure of the TT. The principal roles in the scenario are those of the Science End-User, the Operations Supervisor, The Maintenance Coordinator, the TT Review Board, and the ECS system.

The following steps have been extracted and adapted from the scenario to illustrate how a DAAC might handle a routine ECS problem:

1. Upon realizing that a problem exists, the End User selects a link for the Trouble Ticket process at a related network site (e.g., the EOSDIS Home Page). The TT home page is displayed on the web browser.

2. The End User selects the **Submit** option. The system software retrieves user information and populates the trouble ticket with necessary user data. The End User

enters the problem impact, short descriptions, and long description, and then clicks on the **Submit** button.

3. The system creates a new TT entry in the TT System (Remedy Action Request System), displays the TT number to the user, and notifies the Operations Supervisor.

   - Rules for notification may vary from site to site (e.g., e-mail vs. Remedy).

4. The Operations Supervisor receives notification, selects the new TT from the Remedy Notification Tool, and the system displays the new TT.

5. Optionally, the Operations Supervisor requests reports/lists of current and past TTs to help resolve the problem. The system generates and displays the reports.

6. The Operations Supervisor selects the TT and requests the system to open it.

   - The system (Remedy) opens the TT.

7. On examining the detailed information, the Operations Supervisor changes the value of **Ticket Status** from **New** to **Assigned.**

   - In this scenario, the Operations Supervisor can assign any status or priority to a trouble ticket.

   - In practice each site determines who is authorized to assign TT status and priority.

8. The Operations Supervisor assigns the desired value in the **Assigned-Priority** field.

9. The Operations Supervisor assigns the responsibility for fixing the problem described on the trouble ticket to the Maintenance Coordinator.

10. The Operations Supervisor clicks on the **Apply** button to make the changes effective.

    - The system (Remedy) delivers e-mail notification of the assignment to the Maintenance Coordinator.

11. The Maintenance Coordinator receives e-mail notification of the assignment.

12. The Maintenance Coordinator makes initial entries in the **Detailed Resolution Log** and **Resolution Log** fields (which are free text diaries) indicating the proposed course of action.

    - The person who submitted the TT can review entries in the **Resolution Log** field.

    - The person who submitted the TT *cannot* review entries in the **Detailed Resolution Log**.

13. The Maintenance Coordinator then clicks on the **Apply** button to update the TT with the log data.

    - The system (Remedy) updates the TT.

14. The Maintenance Coordinator analyzes and attempts to resolve the issue that the TT addresses, updating the resolution logs (**Detailed Resolution Log** and **Resolution Log**) with pertinent information.

15. After each update to the resolution logs the Maintenance Coordinator clicks on the **Apply** button to order the system to make the update.

    - The system (Remedy) makes the update to the logs, including:
        - time/date.
        - name of modifier.
        - current log.

16. Upon finding a solution to the problem, the Maintenance Coordinator changes the Ticket Status to Solution Proposed.

17. The TT Review Board Chair includes the TT in a package of new Solution-Proposed TTs being compiled for review by the board.

18. The TT Review Board considers the proposed solution for the TT.

    - TT Review Board deliberations include consideration of the following questions:
        - Is the proposed solution sensible?
        - What are the long-term effects of the proposed solution?

    - The TT Review Board may suggest, comment, reject, approve or otherwise recommend actions as they deem necessary (within the limits of their authority).

19. The TT Review Board approves the proposed solution and changes the **Ticket Status** to **Implement Solution**.

    - If the TT Review Board finds that the problem presented a configuration issue, they generate a CCR.
        - Generating a CCR introduces the problem into the configuration management process.

20. The Maintenance Coordinator makes the authorized fix to the problem and changes the **Ticket Status** to **Solution Implemented**.

21. The TT Review Board approves the fix and determines appropriate entries for the TT fields **Key Words, Closing Code,** and **Hardware Resource.**

    - When the End User has verified the fix, the TT Review Board directs the TT database administrator to close the TT.

    - The database administrator makes the TT Review Board-specified entries on the TT and changes the **Ticket Status** to **Closed**.

22. The End User receives e-mail notification from the Trouble Ticketing System that the TT has been closed.

This page intentionally left blank.

The Problem Review Board and Processing a Trouble Ticket through the Problem Resolution Process

The SEO and the site-level maintenance organization resolve routine maintenance issues at the system level and site level, respectively. For problems that cannot be resolved locally and must be referred to the SMC/SOS Help Desk, the problem resolution process at EDF is applied.

Problem Review Board

In the problem resolution process at EDF, the Priority Review Board (PRB) serves as the forum for discussion of ECS failures or non-conformances. In the initial implementation of the process, the PRB has the following primary functions:

- reviews all NCRs derived from Trouble Tickets submitted by the DAACs/SMC, along with those submitted for problems identified through Development/Test activities.

- sets problem priorities based on problem severity ratings and other factors (e.g., DAAC "Top Ten" or Priority lists, discussion consensus).

- coordinates TT/NCR activities within M&O and with development, customer and user organizations.

- coordinates and distributes the OPS Problem List to:

    - ECS Sustaining Engineering (for setting support resource priorities).

    - Deployment IPT (for setting deployment fix priorities).

    - ECS Prioritization Board (for setting priorities for program Development/ Sustaining Engineering resources).

    - DAACs (for information).

By means of a teleconference the PRB activities are coordinated within the M&O organization and with DAAC/SMC, development, customer, and user organizations. Telecon attendees are listed in Figure 7.

- **Customer representatives**
- **ECS M&O Manager or designee (chairs Telecon)**
- **DAAC representatives**
- **SEO engineering team leads**
- **ECS ILS engineering support representatives**
- **ECS engineering team leads and operations representatives**
- **ECS M&O support staff**
- **ECS development organization representatives**

Figure 7. PRB Telecon Attendees

A typical PRB Telecon agenda is shown in Figure 8.

- Agenda items may be supplemented or replaced with hardcopy or softcopy reports.

- Material from the meeting (including the OPS Problem List) is distributed within each ECS organization and to customer and user organizations as required.

- **Review OPS Problem List and distribution of NCRs by organization, priority and age**
- **Review and set priority for each newly entered problem (NCR) from each site**
- **Assign NCR work-off responsibility to one organization**
- **Review and reset priorities for older NCRs (as required)**

Figure 8. Typical PRB Telecon Agenda

Problem Close-Out

The PRB Telecon coordinates the activities of appropriate groups and personnel to ensure that the causes of all malfunctions are determined through proper investigation and analysis.

- may obtain assistance from system hardware suppliers if necessary.

- coordinates investigations and remedial actions with the appropriate project personnel from the National Aeronautics and Space Administration (NASA).

- assures proper documentation of investigations and remedial actions.

- ensures that configuration changes (if any) are made in accordance with the configuration management procedures.

The following conditions must be verified before a problem may be "closed out":

- Remedial and preventive actions (actions to prevent recurrence of the problem) have been completed on the item in which the malfunction occurred.

- All necessary preventive design changes to the item have been completed and verified through testing.

- Changes in operations, hardware, software, and/or procedures have been verified during operations as providing a satisfactory resolution to the problem.

- Effective preventive actions have been established to prevent problems with other affected items (if any).

The PRB Telecon chairperson signs the close-out report.

This page intentionally left blank.

Making Emergency Fixes

The handling of emergency fixes varies with the nature of the problem and from ECS center to ECS center. There is a scenario in the *ECS Operations Concept for the ECS Project: Part 2A - ECS Release B,* 604-CD-003-002, November 1995, that illustrates the process for resolving an emergency situation involving an ECS hardware malfunction. Of course, each emergency must be dealt with individually; however, the following issues need to be decided in advance to provide a common framework for emergency responses to crisis-level situations:

- contingency plans.

- points of contact.

- general guidelines.

The hardware emergency change scenario should be considered a model process that can be used in the development of specific local procedures for making emergency fixes.

Hardware Emergency Change Scenario

The scenario involves the failure of hardware that requires the emergency replacement of a component that is of a later version than that contained in the baseline equipment. The problem occurs at 7:00 PM on a Saturday evening. The automated tape library (ATL) is inoperable and cannot be allowed to be out of service for the remainder of the weekend.

The following steps have been extracted and adapted from the scenario:

1. The operator has detected a problem with the automated tape library (ATL) and submits a TT. The Trouble Ticketing System records the TT and routes it to the system administrator.

2. The system administrator confirms that the system will not operate and notifies the site maintenance engineer.

3. The maintenance engineer runs further diagnostic tests to confirm the problem.

4. The maintenance engineer reports the problem and symptoms to the maintenance desk of the original equipment manufacturer (OEM). The maintenance engineer records the problem diagnosis and vendor call using the Inventory/Logistical Management (ILM) software application.

5. The OEM maintenance representative arrives on site, verifies the symptoms, and concludes that a controller card has failed. However, the only card the OEM has immediately available is of a later version and no spares are available on site. It will be Monday at the earliest before a replacement board of the same revision level can be located.

6. The maintenance engineer reports the situation to the operations supervisor (i.e., shift leader) for a decision.

7. Because the DAAC cannot afford to have the ATL out of service until Monday, the operations supervisor calls the DAAC manager at home. The crew chief reports the situation to the DAAC manager and obtains approval to replace the defective board with the later version if tests conclude that the new one works properly.

8. The OEM's maintenance representative installs the replacement board.

9. The site's sustaining engineer tests the new controller board, finds that it works properly, and brings the ATL back on line.

10. The sustaining engineer generates a CCR to document the configuration change and the authority for the change.

11. The maintenance engineer records the board replacement using the ILM software application, referencing the related CCR.

12. The maintenance engineer closes the trouble ticket.

13. The maintenance engineer updates the property record with the model, version, and serial number of the new board in the ILM database.

14. The sustaining engineer records the installation in the CCR and routes the CCR to the CM administrator.

15. The CM administrator reviews the CCR and determines whether it needs to be reviewed by the site CCB. (*Note:* If the change affects the ECS Operations Configuration Baseline, the CCR must be forwarded to the M&O CCB for review and approval.)

16. The CM administrator updates the Baseline Manager with the new configuration and the number of the CCR that authorized the change.

17. The ECS SEO reviews the CCR to determine whether it has effects on the ECS system and/or other sites.

18. The Earth Science Data and Information System (ESDIS) CCB receives an information copy of the CCR for their review and concurrence.

19. The CM administrator closes the CCR when the CCB has ratified the change.

If it should later be discovered that the new version of the controller board has adverse effects when operating in the ECS configuration, it would be necessary to obtain a board of the original version to replace the newer version. The replacement of the newer-version board with an older-version board would be recorded on a new CCR that referenced the previous CCR.

Practical Exercise

Introduction

This exercise is intended to give the students practice in writing a trouble ticket, getting access to an existing trouble ticket and changing the information in trouble ticket data fields.

Equipment and Materials

One ECS workstation per student.

Mission Operation Procedures for the ECS Project, 611-CD-600-001, one copy per student.

Release 6A Operations Tools Manual, 609-CD-600-001, one copy per student.

Writing a Trouble Ticket

The exercise involves the writing of a trouble ticket. The exercise begins with an operator becoming aware that a network is running too slowly. The operator prepares and submits a trouble ticket.

Perform the following steps:

1. Prepare a trouble ticket stating that the network is running too slowly.

2. Submit the trouble ticket.

Documenting Trouble Ticket Changes

The exercise requires the student to locate a particular trouble ticket, make changes in trouble ticket fields, and have the changes applied to the trouble ticket.

Perform the following steps:

1. Display the specified trouble ticket on the workstation screen.

2. Make entries in the Detailed Resolution Log and Resolution Log indicating a solution to the problem.

3. Change the Ticket Status to "Solution Proposed".

4. Apply the changes to the trouble ticket.

Documenting Failures and Severity

The exercise requires the student to evaluate trouble tickets and critique the description and assignment of severity.

1. The following is an example long description from a trouble ticket, severity *medium*:

   AMASS 4.12.3 Forced device buffered I/O flush. Free Cache Block Count starvation. This error was not due to a heavy load. It occurred during the morning ingest and amass cache with the installation on 4.12.3 version. I talked to Byron Peters and he will see about more raid for AMASS.

   Technician spoke with Byron Peters and he stated "that this one can be turned into an NCR to replace 20 4-GB RAID drive with 20 9-GB RAID drive." (Also, as a heads-up: We will need different RAID drive for the ORIGIN also once we move the data across.)

   ISSUES related to the delivery of AMASS 4.12.3: 1) cache flush, 2) additional logging set in the version of AMASS delivered, 3) ECS tested and should have sent the low level logging AMASS; Why did we get this version? What is the impact? Why were we not told about the cache issue and logging issue in PSR? And are we off baseline, Or is this the new baseline?

   IMPACT: Does not seem to be major yet; however, we have not fully characterized the Cache Flush and the additional logging (related to functionality and performance).

How does this trouble ticket stack up against a checklist for completeness and accuracy? (i.e., Does it provide a clear statement of the problem? How often does the problem happen? Is recovery possible? How long does recovery take, and how many people are required? Is a workaround available? How long does the workaround take, and how many people are required? What is the impact on daily/weekly quotas?

2. Here is another example long description from a trouble ticket, severity *high*:

   Currently, for FtpPull requests, if granules for a request were successfully staged and a notification msg went out to the user, the request is marked as "shipped." However, it should be marked "staged and notified." When the user actually retrieves the files successfully, only then it should be marked as "shipped."

   To find out if files have been retrieved, a certain software is needed to look into ftp log file, find an ftp session dealing with the files from the request, and based on the ftp session completion status, mark the request. If ECS is not going to support this software development, a DUE option should be considered.

   Without this functionality our distribution people will have a hard time identifying "failed" requests and troubleshooting FtpPull problems.

   Any distribution report/metrics concerning users coming through EDG are incorrect.

Assess the completeness and accuracy of the description, and the assigned severity.

Slide Presentation

Slide Presentation Description

The following slide presentation represents the slides used by the instructor during the conduct of this lesson.

This page intentionally left blank.